PATIENT-CONTROLLED AUTOMATED MEDICAL RECORD, DIAGNOSIS, AND TREATMENT SYSTEM AND METHOD

BACKGROUND OF INVENTION

This application claims priority to U.S. provisional patent application Ser. No. 60/219,773 filed July 20, 2000.

Field of the Invention

The present invention generally relates to a method and system of managing medical and biographical records and providing medical diagnoses. Patient medical and biographical records and medical diagnostic software are stored on a centralized computer accessible by remotely connected computers. The medical records are essentially "owned" by an individual patient who grants or denies varying degrees of access to the records to selected health care professionals based on the health care professional's field of specialty and need to know. The medical diagnostic software receives information provided by the patient and provides the patient with a list of potential medical diagnoses. This information also forms part of the patient's medical record.

Description of Related Art

Medical record systems are well known in the prior art. Medical records have been used throughout the years of the practice of medicine in order to keep track of a patient's medical history, medical observations, diagnoses and any treatments prescribed to the patient. Often, a record contains information as to the success or failure of a particular treatment, a patient's allergies and reactions to drugs or treatments, and a record of patient visits. In addition to serving as a record of medical history and

treatment, the medical record also serves as legal documentation of patient condition and treatment.

Evolution of the health care system is engendering reevaluation of the roles of patients and health care providers with regard to access and content of medical records. Long term relationships and trust between a family doctor and patient are no longer commonplace because a change in residence, job, or insurance carrier often requires the patient to change primary and/or specialty health care providers. Establishing relationships with a new health care provider can be tedious as medical records must first be transferred from previous health care providers and then reviewed by the new health care provider for past history, therapies, and present therapeutic regimes. Also, the new medical record being created by the new health care provider is often incomplete as patients frequently fail to remember to include all the necessary medical or biographical information. In fact, patients sometimes convey erroneous information that can be ultimately detrimental to their health.

Control of the information contained in a patient's medical and biographical record is also becoming a significant public issue and a source of controversy and stress. Presently, such records are treated as being "owned" by the medical offices or institutions in which the records are housed. Distrust on maintenance of confidentiality results in failure to disclose information that may be important for health-care decisions. This distrust may be increased as patients transfer to new health care providers.

Medical record systems usually consist of handwritten notes, pictures, and documents created by a medical and health care professional. Recently, computer programs and systems have become available for the generation, storage, and

retrieval of medical records. In general, such systems operate on a computer owned by a hospital or other health care provider and may only be accessed by health care professionals that are affiliated with the health care provider. Patient medical information is typically input into a medical record by a physician, nurse, or other health care professional.

Several automated medical record systems have been designed and marketed in the health care field. For example, U.S. Pat. No. 5,277,188 discloses a clinical information reporting system having an electronic database including electrocardiograph related patient data. Similarly, U.S. Pat. No. 5,099,424 discloses a computer system for recording electrocardiograph and/or chest x-ray test results for a database of patients. U.S. Pat. No. 4,315,309 discloses a patient report generating system for receiving, storing and reporting medical test data for a patient population. U.S. Pat. No. 3,872,448 likewise discloses a system for automatically handling and processing hospital data, such as patient information and pathological test information using a central processing apparatus. In U.S. Pat. No. 5,065,315, a computerized scheduling and reporting system is disclosed for managing information pertinent to a patient's stay in the hospital. Also, U.S. Pat. No. 5,924,074 discloses an electronic data processing system.

While present automated systems may provide electronic storage of medical data, they typically suffer from significant shortcomings that have plagued medical record systems since their inception. These systems, like their paper record counterparts, are typically only available to health care professionals affiliated with the hospital, clinic, or other health care provider that owns the medical record software program and computer system. Thus, the

information contained in a patient's medical record would not be able to be reviewed by another health care professional who is not affiliated with the health care provider that maintains the medical record software. This becomes an issue for patients who choose to be treated by a different health care provider or who may require treatment while traveling in a location not served by their usual health care provider. Treatment may be prescribed which has been previously determined to be ineffective or which is contraindicated for the patient.

Similarly, health care professionals from different health care providers may not be able to easily review a patient's medical record and confer with each other as to diagnosis and treatment. This may be due to either security controls by the health care provider or by incompatible systems used by different health care professionals. Thus, medical professionals wishing to confer with each other may be required to copy and mail or send a facsimile of the patient's record, introducing privacy and control issues.

Since the existing systems are "owned" by the health care provider, a patient may be kept from reviewing his or her own medical record for the substance or accuracy of its information. Additionally, a patient cannot prevent or control private information contained within the patient's medical record from being seen by any individual that has access to medical records, regardless of whether the individual has any right or need to review a particular portion of the patient's medical record. As such, information which the patient wishes to remain private may be reviewed, thereby compromising the patient's privacy and potentially introducing a negative bias to the health care professional towards the patient. An example of such information may

include past treatment for a sexually transmitted disease or sexual dysfunction that may be irrelevant to a particular medical speciality.

Current medical systems also often do not contain useful data such as family history, biographical data, genetic constitution or make-up, or other information that a patient may add to his or her medical record which could aid health care professionals in diagnosing the patient's condition or determine the best medical treatment.

Moreover, presently available medical records systems are not suited for providing medical diagnoses. Advancements in automation, research, specialization and medical knowledge have permitted modern day health care to be increasingly improved over the care provided in the recent past. While these advancements have resulted in improved success rates of medical treatment, individuals often delay seeking medical attention due to fear of the unknown and the inconvenience of being referred to multiple physicians. Patient referrals typically occur when a primary care physician makes a general diagnosis, then refers a patient to a physician specializing in the area of the diagnosis. Further referrals may occur if the patient is referred to medical sub-specialties for further diagnosis and treatment resulting in additional patient cost, time, and inconvenience. Patients who face these inconveniences and costs or who have experienced them in the past may delay seeking treatment in the hope that a condition may simply go away thereby precluding the need to seek the help of a health care professional. This delay can cause a medical condition which could be easily treated early in its development to require longer treatment or the condition may even become untreatable by the time medical assistance is sought. If the same patients were informed of potential

diagnoses of their conditions, they can be aware of the risks of delaying medical assistance and may be persuaded to seek help earlier. Informed patients may even be able to reduce the inconveniences of multiple referrals by initially seeking the assistance of a health care professional who specializes in treating their particular condition.

Medical information is readily attainable to the public through medical books available in libraries and bookstores, medical phone help or "Ask-A-Nurse" telephone services, audio visual informational programs on television and videotape, and Internet sites specializing in medical care. The amount of available information, however, can be overwhelming to an individual trying to determine the identification of his or her particular health condition who is unfamiliar with researching health information or who lacks a scientific background.

Computer programs have been developed to provide individuals potential diagnoses based on their responses to a series of health-related questions. U.S. Pat. Nos. 5,910,107 and 5,935,060, for example, describe diagnostic programs which can be accessed over a telephone or computer network. An individual is asked a series of weighted questions concerning the individual's health symptoms and can respond with "yes," "no," or "not sure" answers or may be asked to answer multiple-choice questions. From the responses, the program identifies a list of potential diseases which are indicated by the individual's health symptoms. U.S. Pat. No. 5,572,421 discloses an electronic medical history questionnaire in which a patient can respond "yes," "no," or "not sure" to medical questions. The questionnaire then provides the physician with suggested tests that may be performed and conclusions regarding the patient's health. U.S. Pat. No. 5,839,438

discloses a diagnostic system using a neural network to provide a patient diagnosis to a physician from input data comprising measured and interview data regarding the patient's condition. The diagnosis is based upon a databases of physician diagnoses of medical conditions and their corresponding symptoms.

While prior art automated medical diagnostic programs diagnose a condition or confirm a diagnosis made by the physician, they are usually designed to be used by a physician and not a patient. The language and phrasing in these programs are designed for a medical professional and contain esoteric medical and health terms. Most patients do not understand these terms and therefore cannot effectively use the programs. Thus, the diagnostic information provided by these programs does not inform individuals of their various conditions before they seek medical assistance. A further shortcoming of prior art automated diagnostic programs is that they can accept input data that is often erroneous or not helpful. As an individual may select "not sure" or other answers which are not simply "yes" or "no," an individual is able to avoid answering conditions they feel are minor are irrelevant, but which may provide helpful data if the individual were forced to select only a "yes" or "no" response. Thus a software program designed to accept objective data and provide individuals with diagnostic information about their health conditions would be desirable.

Accordingly, it would be beneficial to patients and health care professionals alike to develop an individual patient self-generated, fully controlled and censored, centralized electronic medical and biographical records and medical diagnostic system that may be accessed by patients and health care professionals regardless of their affiliation with

a particular hospital, clinic, or other health care provider. The medical and biographical records and medical diagnostic system would be maintained, stored and delivered by a totally independent institution, not necessarily affiliated with the government, insurance or health care industry. By using common language and phrasing tailored to different levels of education and familiarity with medical and health terms an individual could effectively utilize such a system to determine potential diagnoses prior to seeking medical attention, permit the individual to be better informed as to the potential medical specialty from which to seek assistance, and control the content of and access to the individual's medical record.

A self-generated record of present illness and pertinent information would also benefit individuals by allowing them ample opportunity to ponder and respond without encumbrances from health care providers presence. Such presence often generates discomfort or uneasiness and may lead to confused, unconsciously withheld, consciously suppressed information (*e.g.*, suppressed for fear of embarrassment) or miscommunicated medical and biographical information.

A centralized electronic medical and biographical records and medical diagnostic system would also permit any health care professional to be aware of all of a patient's biographical and medical history that is relevant to treating the patient. Additionally, since the centralized medical and biographical records system would not be the property of any one health care provider, the individual medical records could be owned by individual patients. Thus, patients may authorize or deny access to their medical and biographical records or limit access to only portions of their medical record to specific health care professionals thereby controlling privacy

of the patient and confidentiality of the patient's medical and biographical information. Patients also benefit by being able to add biographical information about themselves as well as review and comment on the contents of their records input by others for substance and accuracy.

A centralized electronic medical and biographical records and medical diagnostic system would also be beneficial in reducing health care costs and being a foundation upon which health care insurance programs may be based. By centralizing the medical history of a patient, reduced costs may be realized through avoiding repeating tests or prescribing medications or treatment that has been previously found to be unsuccessful or contraindicated. Therefore, by reducing unnecessary treatment, health costs would be reduced, resulting in lower insurance premiums from insurers that would not have to cover unnecessary treatments.

SUMMARY OF THE INVENTION

Among the objects of the present invention, therefore, is the provision of a medical records database wherein the medical records are owned by individual patients, the provision of a medical records database that contains data that is entered by the patient, the provision of a medical records database wherein individual patients authorize selected medical professionals' access to selected medical information contained in their medical records, the provision of a medical records database wherein patients authorize, confirm or edit medical professionals' entries made in their medical records, the provision of a medical records database that contains biographical, genetic, and genealogical patient data, the provision of a medical records database that may be accessed by medical professionals irrespective of their

affiliation with a particular hospital, clinic, or other health care provider, the provision of a medical diagnostics program that can be used by individuals to identify potential medical diagnoses, the provision of a medical diagnostics program which requires an individual to answer either "yes" or "no" to a plurality of diagnostic questions, and the provision of a medical diagnostics program that can store potential medical diagnostic information to an individual's medical and biographical record.

Briefly, therefore, the present invention is directed to an automated, patient-controlled, medical and biographical records system that comprises a medical and biographical records database maintained on a central computer connected to a global computer network. The database contains medical and biographical records for a plurality of individual patients which can be accessed by health care professionals selectively authorized by the patients wherein the access is controlled by a security program. The medical and biographical records database is accessible through the use of one or more computers connected to the global network and situated remotely from the central computer. A software program interface provides the authorized health care professionals access to the medical history and biographical information from the patient medical and biographical records database and permits additional patient medical history and biographical information to be input into the patient medical and biographical records database.

Another aspect of the present invention is a method for entering and retrieving patient medical and biographical record information wherein medical, biographical, and security information are maintained for a plurality of individual patients in a medical and biographical records database on a

centralized computer. Patient medical and biographical information is entered into the medical and biographical records database through a computer remotely situated from the centralized computer. Patient medical and biographical records security information is also entered in the medical and biographical records database through the remotely situated computer. A security program is executed which limits access to the medical and biographical records database to individual patients entering medical and biographical information into their own records and to health care professionals selectively authorized by the patients to input additional medical and biographical information to the patients' records. The execution of a security program also limits access to the medical and biographical records database to the individual patients retrieving medical and biographical information from their own records and to individuals selectively authorized by the patients.

Yet another aspect of the present invention is an automated medical diagnosis method in which a patient is asked a plurality of diagnostic questions relating to medical signs and symptoms requiring either a "yes" or a "no" response. The diagnostic questions and the potential responses are stored on a central computer connected to a global computer network and differentially weighted according to their relative importance in determining a medical diagnosis. Remote computers communicate with the central computer via a software program interface wherein the interface program interactively displays to patients a series of the diagnostic questions stored on the central computer. The central computer retrieves the answers patients input in response to the diagnostic questions and correlates the patient responses and the assigned relative weight of the responses to a list of potential diagnoses. The

central computer then provides the list of potential medical diagnoses to the patient via the computer network and remote computer.

A further aspect of the present invention includes an automated medical diagnosis method that includes obtaining patient anatomical data, biochemical data, physiological data, pathological data, genetic data, laboratory data, radiologic and imaging data, dermatological data, otologic and ophthalmological data, nervous system data, cardiovascular data, and the like via sensors are connected to remotely situated computers, comparing the collected patient data to a library of patient data records, and correlating any variation between the collected patient data and the library of patient data records.

Other objects and features of this invention will be in part apparent and in part pointed out hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram of a computer system according to a preferred embodiment of the invention.

Fig. 2 is an exemplary flowchart illustrating a security program of the invention for verifying an individual's identity and authority to access a medical and biographical record.

Fig. 3 illustrates exemplary relative weighting values assigned to answers of diagnostic questions for a given medical condition based on the likelihood that a given answer is related to a potential diagnosis.

Fig. 4 is a flowchart of an exemplary medical diagnosis program according to the invention.

Fig. 5 illustrates exemplary diagnostic questions and their correlation to, diagnostic codes, patient answers to diagnostic questions, and the value weighting of the answer corresponding to different diseases according to the invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Referring now to the drawings, Fig. 1 is an illustrative embodiment of the present invention, which relates to automated medical and biographical and diagnostic systems. Particularly, the invention relates to a voluntary system, shown generally at **100**, in which an individual patient's medical and biographical record information can be accessed, added, modified, maintained, and controlled by the patient. Furthermore, system **100** provides medical diagnostic information in which the patient obtain a list of potential medical diagnoses corresponding to input health symptoms.

The present invention includes a central computer **102** that is connected to a global computer network **104** (*e.g.*, the Internet). Central computer **102** also has access to a medical and biographical records database **106** that contains a plurality of medical and biographical records **112** for individual patients. Also connected to global computer network **104** are a plurality of patient computers **108** and health care computers **110**.

Patients obtain access to their medical and biographical records by accessing central computer **102** via patient computers **108** connected to global computer network **104**.

Central computer **102** executes security program **114** that limits access to medical and biographical database **106** and individual medical and biographical records **112** contained therein. Once a patient's identity is verified by security program **114**, the patient may gain access to his or her own individual medical and biographical record **112**.

Similarly, health care providers obtain access to patients medical and biographical records by accessing central computer **102** via health care computers **110** connected to global computer network **104**. Central computer **102** executes security program **114** to limit access to medical and biographical database **106** and individual medical and biographical records **112** contained therein to health care providers that are authorized by a patient to access the particular patient's medical and biographical record **112**.

Additionally, individuals, whether patients, health care providers, or simply individuals interested in inquiring about a health condition, may execute medical diagnostic program **116** by accessing central computer **102** via either patient computers **108** or health care computers **110** connected to global computer network **104**. Results from the execution of medical diagnostic program **116** are provided by central computer **102** to either patient computers **108** or health care computers **110** via global computer network **104**.

The creation and maintenance of medical records, including: recording and correlating past medical history and biographical information; integrating genetic, laboratory, radiologic, and imaging results, prescribed medications, and treatments; noting patient allergies, reactions, and treatment outcome; updating medical records; emergency recalling medical records; and making medical records available and

transportable is a very detailed and involved task. Extreme care is required to preserve and protect all the information contained in medical records as well as ensure that authorized personnel are able to retrieve information when it is requested. The task is complicated because of the difficulty in obtaining, maintaining, and correlating the information as well as providing security measures to protect access to the information. Solving these multiple difficulties while organizing the system to provide a user friendly program provides substantial benefits to patients and health care professionals.

With the extensive and rapidly increasing pharmaceutical armamentarium available today, it has become difficult for health care providers and patients to be aware of all the drugs taken in the past and the present, as well as their generic equivalents, interactions, and side effects. This is further compounded by the increasing inclusion of over-the-counter drugs, herbal treatments, and the like that many patients intake regularly but do not consider as part of their "medicines" and therefore neglect to inform their health care providers that they are taking such substances. By providing a central registry and a rapid individualized analysis and correlation system, prompt warnings regarding interactions, side effects, and previous use (including effectiveness or lack of efficacy), can be extremely useful and beneficial. Another important contribution of a central registry is the ability to differentiate between intolerance, side effects, or true allergies of patients to drugs.

Moreover, with the ever-increasing mobility of patients and families, the breakdown of roots and family connections, and advances in science, ready access to extensive knowledge of a patient's genealogy, genetics, environmental and biologic

events become important and sometimes crucial in the differential diagnoses and therapy. For example, knowing the genealogy and place of origin of a patient may facilitate locating someone with similar genetic makeup for organ or tissue acquisition or transplantation (*i.e.*, stem cells, etc.). Another example would be an environmental exposure, discovered many years after the event and its correlation to diseases or conditions, that appear unrelated until the correlation is made of biography, location and exposure.

For the patient, the benefits include (1) ready availability of a chronological register of a patient's lifelong medical history, (2) full control of access to personal information, (3) the ability to restrict personal facts or areas of information, (4) ready availability of an electronic, free, easily accessed, confidential, personal medical consultant for health condition diagnosis, (5) a potential reduction in the need for medical services thereby saving money and inconvenience, (6) protection from conflicting therapies, (7) unbiased health care and insurance referral service, and (8) portability of medical history and biographical information between health care providers.

System **100** provides medical and biographical records database **106** which contains medical and biographical records **112**. Unlike the medical records of the prior art which are the property of individual health care providers such as doctors, clinics, hospitals, and the like, the medical and biographical records **112**, or folios, of the present invention are the property of the patients who are the subject of the folios. The patients, being the owner of their own folios, are able to review what is in their folios. They also control access to their folios in part or in total. For example, a

female patient may provide a family doctor with authorization to access general health information in her folio but prevent her family doctor from accessing information she permits only her gynecologist to review.

While the present invention contains medical and biographical records **112** that are the property of individual patients, it may also contain medical records and biographical records **112** that are owned by individual health care providers such as doctors, clinics, hospitals, and the like. A health care provider may to archive some or all of its own records on system **100** and benefit from its central access, security provisions, and other features. In contrast to a folio of an individual patient, the health care provider's archive may contain folios of numerous individual patients that receive treatment from the heath care provider.

Patients and health care providers may add both medical and biographical patient information such as physical examinations, genetic constitution and history, social history, mental and emotional health history, organ system history, surgical history, environmental history, dental and oral health history, laboratory results, radiological and imaging history, treatment therapies and medications history, otological and ophthalmological history, past history of prior injuries, patient health related events, job related health issues, chemical exposures, temperature, metabolic profiles, organ function tests, biochemical, anatomical, physiological, and pathological histories, alternative medicines, and so forth. Entered information may also include family history, or any other information the patient desires to be contained in his or her folio. Additionally, the patients may review entries made by their health care professionals. While the patients cannot delete authorized entries by health care

professionals, they may add comments that they feel are necessary to clarify an entry.

As described above, the folios are stored as records **112** in database **106** associated with central computer **102**. Central computer **102** is connected to a computer network, preferably global computer network **104**. Patients and the people they authorize are able to access a patient's folio via computers **108** positioned remotely from central computer **102** that are also connected to computer network **104**. A significant benefit of the present invention is the ability for patients, and the people that they authorize, to access medical and biographical information stored in a patient's folio regardless of the affiliation of the patient or the medical professional to a particular clinic, hospital or other health care provider. This is significant as a patient's folio may be accessed regardless of whether he or she is being treated at a local health care provider or a remote health care provider such as when a patient is injured while traveling or on vacation.

The present invention can also be modified to provide information in different languages and to translate information from one language to another. Thus, for example, English language text and information can be translated to Spanish to permit Spanish-speaking individuals to effectively use the system.

Another benefit of the present invention is the ability to maintain a complete medical and biographical record over a patient's life. Medical records of the prior art are typically in varying states of completeness and reside at various health care providers that a patient has used over his or her lifetime. In contrast, the present invention provides a centralized medical and biographical record database, which

could be used by all health care providers when treating the patient. As is well known, even the most interested and compulsive of people lack the discipline and perseverance to maintain a record of their lives. Many important pieces of data are forgotten, remembered inaccurately, or confused chronologically. Allowing long-term compilation of data facilitates chronological or correlative analysis which presently is mostly non-existent. Thus, the patient's folio would be essentially complete and selectively accessible to any authorized physician, dentist, or other person.

In a preferred embodiment, each record **112** includes one or more sectors of related medical and biographical information. Although each sector preferably includes individual and independent units, system **100** provides correlative activity between parts of the individual and independent units in a controlled manner. Access to information in each unit is limited to authorized individuals while at the same time serving the needs of all the potential users of the system **100**.

In addition to information contained in patient medical and biographical records **112**, system **100** preferably provides information that is useful to both the patient and physician. Hyperlinks to scientific and medical sources, for example, medical information relating to health signs and symptoms, diagnostic references, medical and surgical therapies, and medical, pharmaceutical, and scientific dictionaries and thesauruses, are available in this embodiment for as much inquiry as desired. Hyperlinks can be designed to provide a progressive hierarchy to satisfy different levels of sophistication. Those skilled in the art understand many

techniques for providing linking and searching via global computer network **104**.

The present invention may include a variety of systems and processes to achieve an automated medical record, diagnosis, and treatment system and method that is patient owned and controlled. The following are examples of some systems and processes which may be included in the present invention: registration; identification; a security process and system to allow or deny accessibility to the medical and biographical records; entry of medical history; recording information in medical and biographical records (*e.g.*, medical history; physical examination; anatomical, biochemical, physiological, pathological, and laboratory tests; and radiology and imaging information among other information); analysis and correlation of health symptoms; accessing disease and symptom oriented treatises such as the Merck Medical Manual, medical journals, and so forth; diagnosing medical conditions based upon weighting patient responses to diagnostic questions according to the relevancy of the answers to a particular disease or condition; providing an individual with therapeutic recommendations; recording actual medical therapies prescribed to a patient; predicting patient outcome to a given therapy; recording actual outcome to a given therapy; mental and emotional health and counseling; electronic dermatological evaluation which may include a dermatopathology atlas; electronic ophthalmologic evaluation and atlas; dental and oral care and surgery; providing an individual with social and welfare services; cumulative recording of radiological and imaging studies; cumulative recording and correlation of anatomical, biochemical, physiologic, pathologic, and laboratory studies; referral to health care provider; evaluating a health care provider;

monitoring health care provider; notifying a patient of medical due dates; developing a genealogy tree; developing a patient's genetic constitution and history; providing access to medical, pharmaceutical, biologic, scientific dictionaries, thesauruses, etc.; acquisition and evaluation of audio and/or video information from directed self-examination; acquisition and evaluation of biologic parameters and electronic information and examinations; insurance program registration and automatic updating; and primary and specialist information interchange.

The preferred process and system requirements include immense data collection and correlation capability, easy portal accessibility, a multilevel security system, data entry and periodic upgrading by multiple health care providers; and acquisition of proprietary information and sources.

Referring now to the registration process, each patient will own his or her personal unique folio. System **100** permits only the patient, or his or her representative (*e.g.*, parents of an under age child), to register. It is envisioned that eventually most patients will be registered at birth and the folio containing the patient's life medical history being maintained henceforth. In order to maintain a unique folio for each patient and to ensure that only the patient and those to whom the patient has granted authority will have access to the patient's folio. This may be done by requiring an identification sequence tobe input wherein identifying data unique to the patient is required to access a folio. Examples of such identifying data include 1) full name of the patient, without abbreviations, 2) state or country of birth, 3) birth date (dd/mm/yyyy), 4) patient social security number (SSN), and 5) a personal identification number (PIN). Additionally, as advances in technology permit, the identity of a patient

may be verified by physical identifiers. Examples of such identifiers, also referred to as biometrics identifiers, include 1) fingerprint(s), 2) retinal or ocular image, 3) voice pattern (with or without a key verbal code), 4) DNA or generic print, and 5) biochemical or blood type (AB, Rh, etc.).

In addition, depending on the level of security desired, an electronic signature may be required of the patient or registrant to enhance security of the identification sequence. The signature can be requested at the time of registration or at the end of the interaction to add further recognition of the validity of the included information, or as a legal validation of the preceding text. With the previously described registration and identification steps, the affixed signature at the end of the document, including the option of requiring a repetition of the identification sequence, would improve the security of data as well as provide an electronic signature for legal purposes.

The identifying data references are keyed to a unique number that has been randomly assigned to the patient upon initial registration. This number is randomly assigned to prevent a folio from being correlated to a particular registration date, patient name, or other information that may indirectly identify the identity of a particular patient. The unique number in turn references the patient's folio. Thus, the folio does not contain the actual patient identification data, but rather just the unique number. The separation of patient data from medical and biographical data and the requirement of a randomly assigned number increases the security of a patient's medical and biographical information from being accessed by an unauthorized individual breaking into computer **102** and its associated database **106** used to

store the patient's folio. Thus, if unauthorized access is gained by someone breaking into system **100**, all that could be accessed would be medical and biographical data that is anonymous except for the unique randomly assigned number.

By maintaining separation of a patient's identifying data from his or her actual medical and biographical data, medical and biographical data can be studied for information with full preservation of patient anonymity. This way longitudinal and population studies can be performed without compromising the confidentiality of a patient's medical and biographical record.

The PIN or biometric key permits the patient or an individual authorized by the patient to obtain access to the folio containing the patient's recorded medical and biographical data. Additional security procedures of the present invention may be implemented such as requiring reentry of the patient's PIN or biometric data for opening the folio or secured portions within the folio. Copying of records without proper authority (*i.e.*, without the patient's PIN or biometric verification) would be attached to a "cookie" that would eliminate or scramble the unauthorized copied data from any files where the data was copied. A "cookie" is a small program or file that executes a specific command, such as delete or scramble a file, by utilizing the computer into which the program has been imported for command execution.

In another embodiment, health care providers may also wish to take advantage of the security offered by the registration and identification sequence requirements provided by the present invention to store their patients' records. A health care provider may store multiple records of its patients. In this scenario, the identification sequence is the same as for any registrant, whether a health care provider

or a patient. Once entered into the individual health care provider archive, access is granted to each one of the files the health care provider registrant has generated or stored in medical and biographical records database **106**. The individual files contain only the information that the health care provider has specifically included in these files, but requires the active participation or an affirmative action of the health care provider for the inclusion of information to occur. This affirmative action confirms the positive desire of information inclusion, therefore negating the possible health care provider assertion of ignorance of information inclusion. The system and method illustrated in figures 1 to 5, described below, are the same for this embodiment except that the health care provider, and not the patient, controls access to the health care provider's patient records.

Access to each one of the patient records in the medical and biographical records database requires re-identification of the health care provider (by whichever measure is established by the health care provider) before opening the individual file. This additional step circumvents the possibility of unauthorized access to the files of the medical and biographical records database if it is inadvertently left open by the health care provider.

The system **100** further protects the health care provider's records or files from being forwarded to another file or database by requesting specific authorization for forwarding by the individual registered as the subject of the file. This extra measure complies with the requirements of the Health Insurance Protection and Portability Act (HIPPA). The specific authorization restriction of HIPPA can be avoided by transferring the responsibility for the information to the individual, for the individual's personal files. The

assumption is that all the health care information (excluding financial and other types of documents) contained in the health care provider files should be also included in the individual's personal file.

Fig. 2 is an illustration according to the present invention of a security process and system used to ensure that only authorized individuals gain access to data stored in medical and biographical records **112**. Data elements of the system hardware of the present invention are physically separated to prevent unauthorized individuals from breaking into system **100** and gaining meaningful medical and biographical data. Additionally, software filters, designated as "F" in Fig. 2, are present between the elements of system **100** to exclude any extraneous or corrupting files, electronic cookies, or misinformation.

Beginning on Fig. 2A at step **202**, an individual connects to central computer **102** via remote computer **108** connected to global network **104**. Central computer **102** executes a login routine to ask the individual login questions at step **204** to verify that the individual owns one of the medical and biographical records **112** or that the individual has been authorized by the owner of one of the medical and biographical records **112** to access the record. At step **206**, the individual enters the login information. Central computer **102**, at step **208**, compares the information the individual entered with stored information of the medical and biographical record owner. If the information entered by the individual does not match the stored information of the medical and biographical record owner, central computer **102** stores information such as the computer address of the individual attempting to login, time, and any information input regarding the login attempt at

step **210**. The individual is then disconnected from central computer **102** at step **212**.

If the information entered by the individual matches the stored information of the medical and biographical record owner, a patient number is obtained at step **214** which corresponds to an individual medical and biographical record **112**. The process proceeds to Fig. 2B at step **216** wherein the medical and biographical record **112** corresponding to the patient number is referenced from record database **106**. At step **218**, central computer **102** determines whether the individual wants to run the medical diagnostic program illustrated in detail in Fig. 4. If the individual does not wish to execute the medical diagnostic program, the process proceeds to step **220** where the patient is permitted to review and add information to the medical and biographical record **112** according to the level of the individual's authority. The process is then discontinued at step **222** and the individual is logged off central computer **102**.

If, at step **218**, central computer **102** determines that the individual wants to run the medical diagnostic program, the process proceeds to step **224** where a symptom or series of symptoms are presented by the individual. Also, a diagnostic server provides the individual with diagnostic questions that attempt to clarify the cause of the symptoms (see medical diagnostic program **116**). The individual enters answers to the diagnostic questions via remote computer **108** at step **226**. Preferably, a separate answer server stores the answers which are entered. At step **228**, central computer **102** determines whether any additional diagnostic questions must be asked of the individual. If additional questions must be asked, the process proceeds to step **224**. If no additional questions must

be asked of the individual, the process proceeds to step **230** where the summary of answers as identified in Fig. 4E, step **460** are presented to the patient by a separate temporary answer server to verify whether the summary of answers to the diagnostic questions are correct.

Central computer **102** determines at step **232** whether the summary of answers to the diagnostic questions are correct. If the summary is not correct, at step **234** which corresponds to Fig. 4E, step **466**, the diagnostic program **116** asks the patient to identify the portion of the summary that is incorrect. The process then proceeds to step **224** where the patient is presented with questions by the diagnostic server which correspond to the section of the summary that the patient identified as being erroneous.

If, at step **232**, central computer **102** determines that the summary of answers to the diagnostic questions are correct, a list of potential diagnoses, preferably listed in the order of most likely to least likely, is presented at step **235**. The process proceeds to step **236**, which corresponds to Fig. 4E, step **468**, where central computer **102** determines whether the individual wants to store the diagnostic information in a medical and biographical record **112**. If the individual does not want the information stored in a medical and biographical record **112**, the process continues at step **220** where the patient is permitted to review and add information to the medical and biographical record **112** according to the level of the individual's authority. The process is then discontinued at step **222** and the individual is logged off central computer **102**.

If the individual wants the information stored, central computer **102** stores the information in a medical and biographical record **112** at step **238** then proceeds to step **220**.

Health care providers may be charged for the service of transferring patients' recorded medical histories to its own records thereby generating service and access fees. A reliable medico-legal document can be obtained by the health care provider in case of challenges to the amount or quality of the information offered for evaluation.

Remote computer terminals can be located in the offices of health care providers for the individual medical history generation prior to physical examination, interview or therapy. This allows the individual to update information periodically on a timely basis.

In addition to registration, an important component of system **100** involves access. By utilizing variables of the registration information, different levels of access and security can be offered. Access to folio identification requires a minimum amount of identifying data. For example, the input of a patient's full name, without abbreviations, birth date (dd/mm/yyyy), and social security number (SSN) is used to gain access to general information in the folio. Adding the state or country of birth, plus a health care provider's access number (*i.e.*, BNDD (Bureau of Narcotics and Dangerous Drugs) + State license number, etc.), for example, allows an internist to access to past history sections of the folio, whereas a pharmacist's access number may allow access to only the medications and allergies section of the folio.

Information regarding the use of identification information by an individual accessing a folio may be stored to the folio, thereby leaving a traceable and registered chronological history of the folio being accessed. Making

access information available to patients, on demand or during periodic notifications instead of a periodic notification, permits patients to verify whether their folio has been accessed and who accessed it. The access information therefore provides patients with the assurance that access to their folios is limited to themselves or individuals to whom they have authorized and that the confidentiality of their folios has been maintained.

For alterations, additions, or deletions to the medical history, the use of a PIN or biometric identification is required for authorization. Otherwise, the entry is considered an unconfirmed alteration, addition, or deletion. Only after a patient's identity or authorization is confirmed would the entry be considered official. Entries may be color-coded to distinguish unconfirmed information in a folio. The same method of verifying official entries may be followed for entries of medications, lab results, etc. Therefore, official data is incorporated in the folio as such only with approval of the authorized individual or patient, unapproved data is labeled or color-coded as such.

In addition to the verification methods described above, patients may be issued a magnetic strip card, similar to a credit card, on which all of the identifying information may be stored. The patient's PIN or biometrics identification is not to be stored on the magnetic strip card. Rather, this identifier is preferably supplied separately before access to a patient's folio is granted. The folio is divided into separate sections of medical and biographical information. This permits sensitive information maintained in the folio to be protected in controlled access areas. Controlled access areas require reentry of the PIN, entry of a different PIN, or biometric information to permit viewing. Entry of an

additional, different PIN is required to permit information to be copied or transferred. Requiring additional levels of identification of access authority is designed to increase security, and disclosure of patient medical and biographical information as well as increase patient confidence about folio confidentiality.

In emergency situations, when patient authorization via PIN or biometric information is not available to enable emergency medical professionals to gain access to a patient's folio, an emergency summary package, containing vital information only, is made available to a properly identified emergency institution. Thus, the confidentiality of a patient's folio can be protected, even in emergency situations, by ascertaining folio access authorization, keeping records of these releases, and properly informing the patient when emergency releases are made. Furthermore, the present invention provides superior benefits over existing medical record systems as emergency personnel may be able to obtain vital information, regardless of whether the patient is at home or in another state, in the event the patient is incapacitated. This permits emergency medical professionals to treat the patient more rapidly and with more confidence than they could without obtaining the patient's vital information.

In addition to centralized, medical, and biographical records database **106**, the present invention also includes medical diagnostic program **116**. The medical diagnostic program **116** is preferably a free, confidential, personal, and continuously available electronic consultant that is available to individuals who have access to a computer with access to computer network **104**. Similar to the medical and biographical record database **106**, the medical diagnostic program **116** would

reside on central computer **102** connected to network **104**. While individual registration for a medical and biographical record **112** is not required, information can be stored to a registered patient's folio if the patient requests the recording.

Fig. 3 identifies an illustrative set of answer weighting values and corresponding frequency categories which correspond to expected frequencies of the answers to diagnostic questions for a given disease. Two frequency categories are identified. The first category of identified frequencies is more preferred as it permits more narrow frequency delineations while the second category of identified frequencies provides less exact delineations to be made for a given answer. The answer weighting in the preferred categorization ranges from -10 to 10 based on a frequency range of "impossible to be connected to diagnosis" to "indispensable." The answer weighting in the second frequency categorization ranges from -9 to 9 based on a frequency range of "Very strong indication for different diagnosis" to "Very strong."

The assigned weighting value for an answer may be different for different diseases based upon the frequency the answer is expected. In the example of Fig. 3, the answer weighting value of "10" may be assigned for the diseases of angina, myocardial infarction, and pulmonary embolus if "yes" is answered for the diagnostic question, "Are you experiencing chest pain?" as the symptom is indispensable to all three diseases. Conversely, an answer weighting value of "5" may be assigned to the disease of pneumonia since the frequency of the symptom is common to the disease, but not necessarily indispensable in patients with pneumonia.

An answer weighting value can also detract from the likelihood of a particular disease being diagnosed if the

frequency of the answer ranges from unlikely to occur to impossible to be connected to a given disease. Such negative weighting indicates that the answer to the diagnostic question may suggest the diagnosis of a different disease. For example, the answer weighting value of "0" may be assigned for the diseases of angina, myocardial infarction, and pulmonary embolus if a patient responds "no" to the question, "Are you experiencing back pain?," as the symptom is rare or unusual for those diseases. Conversely, an answer weighting value of "-3" may be assigned to the disease of carotid artery dissection since the frequency of the symptom is "very unlikely to occur with diagnosis," or the answer is a "potential indication for a different diagnosis."

The assigned values, value ranges, and frequency categories may be modified to enlarge or reduce the values or frequency categories without being outside the scope of the present invention.

Fig. 4 illustrates an exemplary overview flowchart of the medical diagnostic program process. The process begins with step **402** in which a patient inputs symptom(s) being experienced. Also at step **402**, medical diagnostic program **116** asks a diagnostic question about the health symptoms being experienced by the patient. At step **404** the patient answers the question by inputting either "yes" or "no" as the only possible responses to the question. An answer must be received from the patient in order for the process to continue. A weighted value is assigned to all potential diseases at step **406** according to the patient's response to the diagnostic question. The weighted values for all the potential diseases are stored to memory. Next, at step **408**, the process determines whether the patient has been asked and

has answered all required health symptoms questions. If all required health symptom questions have not been asked, the process loops back to step **402** and asks the patient another health symptom question. If the patient has been asked and has answered all health symptom questions, the weighted values for each potential disease are summed in step **410** to produce a total weighted value for health symptoms for each potential disease. The total weighted value for each disease is stored to memory.

The process continues at step **412** where the patient is asked a complex symptom question. Complex symptom questions include "and, or, not, both, or none" type questions and combine a plurality of symptoms in each question. At step **414** the patient answers the question by inputting either "yes" or "no" as the only possible responses to the question. An answer must be received from the patient in order for the process to continue. A weighted value is assigned to all potential diseases at step **416** according to the patient's response to the diagnostic question. The weighted values are then multiplied by a pre-defined value determined according to the importance of the answer to the complex question for a particular disease. The weighted values for all the potential diseases are stored to memory. Next, at step **418**, the process determines whether the patient has been asked and has answered all complex questions. If all complex questions have not been asked, the process loops back to step **412** and the patient is asked another complex question. If the patient has been asked and has answered all complex questions, the weighted values for each potential disease are summed in step **420** to produce a total weighted value for answers to complex questions for each

potential disease. The total weighted value for each disease is stored to memory.

The process continues from step **422** through step **450** for questions relating to health signs, patient past history, and family history and other types of medical, health, or biographical information in the same manner as described above. When medical diagnostic program **116** is used in conjunction with medical records database **106**, this information may be automatically retrieved from the patient's individual record **112**.

The process continues at step **452** where laboratory, imaging, electro-diagnostic, sonographic, and other test results stored in patient medical and biographical records **112** are determined and assigned a weighted value based upon the frequency of the test results occurring for a given disease. The weighted values assigned to the potential diseases are stored to memory. At step **454** the weighted values assigned for the test results for all the potential diseases are summed to produce a total weighted value tor test results. The total weighted value for test results is then stored to memory. Next, at step **456**, the process sums the total weighted values for health symptoms, complex questions, health signs, patient past history, family history, and test results to produce an overall weighted value for each disease. The diseases are preferably ranked by probability of being correct from the highest to the lowest score. At step **458**, diseases and suggested therapies to treat the diseases are listed to the patient as probable diagnoses and treatments according to the overall weighted values for the diseases. The probability that the patient actually has a listed disease increases correspondingly to the overall weighted value for a disease.

Thus, the disease with the greatest overall weighted value is the most probable diagnosis for the patient, and the disease with the smallest overall weighted value is the least probable diagnosis. At step **460**, a summary of the answers to the diagnostic questions is presented to the patient for review and approval. At step **462**, the patient reviews the summary of the answers. At step **464**, the patient is asked whether the summary correctly states what the patient had meant to input. If the patent indicates that the summary is incorrect, at step **466** the patient identifies the portion of the summary which is erroneous. The process then continues at either step **402, 412, 422, 432,** or **442** and the patient is presented with questions corresponding to the section of the summary which the patient identifies as being erroneous. Upon answering all the questions, the answer values are summed in either step **410, 420, 430, 440,** or **450** and the process continues to any other section which corresponds to a section of summary which the patient also identified as erroneous. If no other section was determined to be erroneous by the patient, the process continues at step **456**.

If, at step **464**, the patient indicates the summary is correct, the patient is asked at step **468** whether the diagnostic information should be stored to a medical and biographical record **112** belonging to the patient. If the patient responds affirmatively, the diagnostic information is stored to the patient's medical and biographical record **112** at step **470** and the process is ended at step **472**. If the patient indicates that the diagnostic information should not be stored in the patient's medical and biographical record **112**, no storage to is conducted and the process is ended at step **472**.

Fig. 5 is an illustration according to the invention, in a tabular form, that correlates the diagnostic questions, diagnostic codes, patient responses to diagnostic questions, and the value weighting assigned to different diseases for responses to the diagnostic questions. For identification purposes, individual cells are identified by column number and row number (**column, row**). The figure is merely one illustration of how diagnostic information may be processed and is not meant to be limiting as to the broad scope of manipulating the medical diagnostic information of the present invention.

Column **502** lists the various categories and subcategories of questions asked the patient. Column **504** lists the unique code identifier for each question presented to a patient. Column **506** lists the patient's responses corresponding to the questions listed in column **502**. If the patient responds "yes" to a question listed in column **502**, a "111" is stored in column **506**. If the patient instead responds "no" to the question, a "000" is stored in column **506**. For purpose of processing the questions and answers, the answer code "111" or "000" is appended to the code for the question. Once the patient inputs an answer to a diagnostic question, an answer weighting value is determined for the answer which corresponds to the diseases listed in columns **506, 508, 510, 514,** and **516**.

For example, a patient is asked a health symptoms question relating to whether the patient is experiencing chest pain (**502, 518**). The code for chest pain is identified as 0000030001 (**504, 518**). The patient responds "yes" to the question, indicating that the patient has experienced chest pain. Upon receiving a "yes" answer, "111" is stored in answer cell (**506, 518**). The diseases of angina, myocardial

infarction, and pulmonary embolus each have an answer weighting value of 10 for a "yes" response as the symptom, according to Fig. 3, is indispensable for those diseases. An answer weighting value of 10 is then stored in cells (**508, 518**), (**510, 518**), and (**512, 518**) respectively. As the symptom of chest pain for aortic artery dissection is very important, but not necessarily indispensable according to Fig. 3, a value of 8 is stored in the aortic dissection cell (**514, 518**), corresponding to the symptom of chest pain. For the disease of pneumonia, the symptom of chest pain is common according to Fig. 3, and therefore a value of 5 is stored in the pneumonia cell (**516, 518**).

Similarly, the patient is asked whether he or she is experiencing abdomen pain. The patient answers "no" to the question, indicating that abdomen pain has not been experienced. Upon receiving a "no" answer, "000" is stored in answer cell (**506, 520**). The diseases of angina, myocardial infarction, pulmonary embolus, aortic dissection, and pneumonia each have an answer weighting value of 0 for a "no" answer as the symptom, according to Fig. 3, is either rare or is irrelevant to determining a diagnosis for those diseases. An answer weighting value of 0 is then stored in cells (**508, 520**), (**510, 520**), (**512, 520**), (**514, 520**), and (**516, 520**) respectively.

Next, the patient is asked whether he or she is experiencing back pain. The patient responds "no" to the question, indicating that back pain has not been experienced. Upon receiving a "no" answer, "000" is stored in answer cell (**506, 522**). The diseases of angina, myocardial infarction, pulmonary embolus, and pneumonia each have an answer weighting value of 0 for a "no" answer as the symptom, according to Fig.

3, is either rare or is irrelevant to determining a diagnosis for those diseases. An answer weighting value of 0 is then stored in cells (**508, 522**), (**510, 522**), (**512, 522**), and (**516,522**) respectively. Back pain, however, is very unlikely to occur with carotid artery dissection and therefore, according to Fig. 3, an answer weighting of -3 is stored in cell (**514, 522**).

This process continues until the patient has been asked and has answered all diagnostic questions selected by the diagnostic program **116**. The answer weighting values are then summed for each disease column to produce an overall weighting value for each disease. When all the answer weighting values are added together, the negative values assigned to answers unlikely to be given for a given disease lower the overall weighting value of a disease while the positive numbers increase the overall weighting value of a disease. The overall weighting value for angina is 256 which is stored in cell (**508, 524**); the overall weighting value for myocardial infarction is 285 which is stored in cell (**510, 524**); the overall weighting value for pulmonary embolus is 170 which is stored in cell (**512, 524**); the overall weighting value for aortic dissection is 111 which is stored in cell (**514, 524**); and the overall weighting value for pneumonia is 27 which is stored in cell (**516, 524**). Thus, given the abbreviated example listed in Fig. 5, the patient would receive a list of potential diagnoses, in order of most likely to least likely, of myocardial infarction, angina, pulmonary embolus, aortic dissection, and pneumonia.

According to a preferred embodiment of the invention, data may be acquired by directed data acquisition and/or interactive interview or inquiry. Directed data acquisition

represents all data acquired by the medical diagnostic program from direct entry of information, and not by interactive interview. Examples include vaccinations, birth and developmental data, previous diagnoses and prescriptions, present and past medications and therapies, surgeries and findings, pregnancies and deliveries, review of systems, habitual and social history, family history, and so forth. This information is individually supplied data which is not generated by the diagnostic questions, such as data present in a patient's folio, or supplied by a third party and approved for entry into a patient's folio after review and approval by the patient.

In another embodiment, the diagnostic program may also be used by a health care professional in the same manner as it is utilized by a patient. Information may be input while a patient is being interviewed as well as from medical records and notes taken by a health care professional during an examination. The potential diagnoses list may then be displayed to the health care professional and also be approved by the health care professional for entry into the health care provider's medical and biographical record for the patient.

The program **116** obtains information from an individual through an interactive interview. The interactive interview consists of multiple-looped pathways that directs the medical diagnostic program to present appropriate diagnostic questions to the individual and simultaneously weight the answers. The distinguishing characteristic of this system is that data is obtained by sequential questioning that can only be answered in the affirmative (yes) or the negative (no). Entry of single or multiple symptoms, signs, conditions, diagnosis, medications, or treatments, initiates the interaction. Laboratory, radiology, or pathology information is integrated

as available through the directed data acquisition as described above.

Starting from simpler to more complex pathways, different levels of sophistication are addressed and satisfied. The interview is constructed in a clinical format, exhaustively asking the individual diagnostic questions in the how, when, what, where, and why format in order to reach potential diagnosis. Graphics, in the form of diagrams, models, pictures and illustrations (body, system, function, and so forth) are part of the inquiry, requiring individual interaction to help pinpoint areas where symptoms are being experienced. Degrees of intensity, frequency, duration, and so forth are digitized and/or color-coded for estimation of severity. Sidebar illustration or diagrams are used to clarify questions or guide responses. Hyperlinks are made available to the individual to assist the individual to define, clarify, amplify terms, conditions, diagnosis, recommended therapies, etc. Examples of hyperlink languages that can be provided include 1) conversational or general public; 2) scientific oriented; and 3) medical terminology.

In one embodiment, three-dimensional and holographic imagining illustrating questions and answers are used further to refine the information. No diagnosis is considered or reached until all the symptoms and signs have been elicited and examined. From the list of potential diagnoses, further questions may be raised to refine the probability sequence. This method or particular approach mimics the ideal that no diagnostic assumptions are made until all the information is elicited. Thus, the method of the present invention avoids the introduction of any bias which may result in the correct diagnosis being missed.

As many complaints and modifying adjectives as can be collected are utilized to cross-match with the presenting complaints. Each complaint is examined individually to ensure that the meaning of each complaint is correctly understood. Different combinations of symptoms are examined to define their relationship to the health condition being experienced by the individual. These are also examined in the Y/N format. A number of questions, including instructions to elicit signs, would be provided to the individual to answer.

With sufficiently detailed elicited information, and without the benefit of a physical exam, it is highly probable to obtain a reasonable and correct diagnosis. Additional information on health related signs may be obtained by directing the individual to perform easily described tasks and then recording the results. When technology permits, electronic examinations via electronic audiovisual sensors can be used to further corroborate or expand the information basis. Such information can be obtained from electronic audiovisual sensors connected to remote computers that collect patient anatomical data, biochemical data, physiological data, and pathological data hereinafter collectively referred to as health data. Examples of health data include, but are not limited to, temperature, metabolic profiles, organ function tests, laboratory data, radiologic and imaging data, dermatological data, otologic and ophthalmological data, nervous system data, cardiovascular data and so forth. An example of this is the collection of cardiovascular sounds via phone-modem. The individual is then reexamined in the yes/no (Y/N) format to further corroborate the data obtained from the audiovisual sensors.

A series of strategies can be designed to instruct and guide the interviewee into eliciting pertinent positive or

negative signs to further refine the diagnoses. With the rapid progress of providing and obtaining audiovisual information on the Internet, obtaining an extensive exam via audiovisual information may also be used to further the diagnoses. An example would be cardiopulmonary, abdominal, and peripheral vascular auscultation. With sophisticated programs, many of the obtainable cardiac, vascular, pulmonary and abdominal sounds and rhythms, combined with a careful history interview can be very sensitive and precise in identifying potential diagnoses. Static or continuous visual digital images transmitted via Internet would nearly obviate the need for most personal encounters between health care provider and patient. Hyperlinks could be readily available to guide the examination by giving detailed step-by-step instructions.

By using the present invention, an individual can prepare for a medical appointment or examination. By executing the medical diagnostic program, an individual is presented with potential questions that would likely be asked during an actual medical appointment or examination. Thus, the medical diagnostic program prompts the individual to recall and verify potential patient history or medical information that may be important to provide a medical professional during the individual's actual medical appointment or examination.

Potential diagnoses are offered in list form identifying potential diagnoses from most too least likely condition. Recommendations, including further inquiries, tests, therapeutic methods, or consultants are posted for the individual to review. Local, regional, and national health care provider listings are also posted with further pathways for deeper exploration of credentials, etc.

Drug reference sources, *i.e.*, PDR, toxicology, and so forth, are part of the immediately available information. In addition, correlation of treatment and side effects can be rapidly interconnected. Adding commentary by experts on recent advances in diagnosis or therapies, including experimental work (using pro and con sides) further enhance the usefulness of the diagnostic program.

Although computer presented information is typically visually based, the present invention may be transformed to an audio format that further extended the reach of the method for dyslexics, blind, or the illiterate.

The interactive multi-looped interview will require the input of many specialists. To attain efficiency, practicality and balance, each section will benefit from input from academic and non-academic health care providers. Physicians, nurses, therapist, counselors, clergy, etc. are considered specialist in their areas or sections.

A further embodiment of the present invention can be applied to insurance processing as a source of insurance services and revenue. Data contained in the medical records database as well as information generated from the medical diagnostic program can be integrated to provide insurance review systems necessary information to review, approve, or pay for health care transactions. Examples of insurance company services that are particularly suited to utilize information stored in the medical and biographical database consist of terms of insurance contracts, explanation of benefits and services, pre-approval of patient services, pre-approval of treatment, approval of treatment, verification of eligibility for medical treatment, verification of treatment, and automated payment of medical treatment by insurance companies. Thus, an insurance review system can be

implemented using the structure of the present invention that would satisfy the most demanding of all reviews, at a reasonable cost and expediency, while at the same time preserving privacy and confidentiality.

Treatment and testing redundancy occurs frequently in the present medical care environment due to the absence of a common repository of information and it ready availability. An immediate benefit to insurance providers utilizing the present invention would be the elimination of unnecessary test, procedures, operations or treatments that had already been done, prescribed or tried, thereby reducing redundancy and repetition of failed therapies. In addition, test, procedures, treatments, or operations that did not satisfy previously established criteria threshold could be halted immediately. Conversely, if a health care professional strongly felt that the recommended test, procedure, treatment or operation was necessary, immediate feedback would allow him or her to satisfy the criteria or else present the necessary argument to a reviewer to obtain permission to proceed. The reviewer would have all the necessary information immediately available to approve or refuse the request. All of these functions could be performed with full preservation of confidentiality.

Insurance provider screening criteria can contain patient medical information, contract parameters and stipulations, allowances, restrictions, requirements, and characteristics of the insurance plan or coverage in which an individual is a participant. An insurance provider can immediately know whether a prescribed service, treatment or medication is covered by the particular plan and to what extent. Because updates to the criteria can be implemented immediately, the frequency of errors and non-covered procedures could be

substantially reduced, resulting in significant savings for all involved.

One of the elements of checks and balances in the insurance review system is patient review of the entered data. Since the records belong to the patient, if a patient disclaims the veracity of the data upon reviewing entered data, an immediate denial of an insurance claim and subsequent investigation would be triggered. Any health care professional with multiple denial events could lose the privilege to participate in the program.

Even with the above checks, a patient and an health care professional could agree to abuse the system. Single or multiple violations may escape detection; patterns of abuse may eventually become evident, however, by comparing deviations from patterns of other health care professionals. Substantial deviations can be automatically be culled out, permitting close scrutiny of activity and much earlier detection of fraud than occurs in current insurance practices. One potential remedy, for example, can be requiring a second opinion or review by an independent consultant selected by the third party payor or the obtaining of laboratory studies to confirm a disorder or the intake of medications, and so forth.

Due to the explosive growth of medications, alternative brands, and generics, there is a real risk that even the best informed and intentioned of health care professionals may miss an unintended interaction or secondary effect of a medication added to other medications already in use or to an underlying condition. By integrating all available information for a given patient and referring to massively stored drug information, undesired events could be significantly reduced, albeit not eliminated completely, due to the inability to infallibly predict all the potential reactions of one

particular individual to a given biochemical combination. In spite of being able to completely avoid undesired events, the potential savings in terms of reduction of iatrogenic injury, wasted medications or therapies, and prevention of costly side effects are great.

Another potential application is allowing insurance provider reviews to be conducted remotely while still protecting privacy and confidentiality of the patient and the medical and biographical data. The requesting reviewer can submit the necessary identifying data and permission from a patient to obtain medical and biographical data. The identification server would select the secret random number assigned to that specific patient, select the required information and delete identifying data (*i.e.*, names, nicknames, initials, birthdays, addresses, etc.) and submit anonymous records to the reviewer. Of course, a single patient request would be difficult to disguise, but the assumption is made that multiple charts would be requested by any one reviewer, diminishing significantly the chance of individual identification. Because of this potential breach of confidential information safeguarding, the first alternative is more secure and the preferred one.

The utilization of the present invention by insurance providers would substantially reduce the cost of service, review, delays and while maintaining confidentiality of patient medical and biographical data. By acting as a neutral intermediary, and at the same time facilitating services for the user and cost controls for the payor, a fee for utilizing the services of the present invention should be cost effective for insurance providers.

In one aspect of the insurance processing embodiment, an insurance provider is given access to review a patient's

medical and biographical record. The insurance provider's contractual criteria for coverage is compared to the medical treatment claimed and the patient's medical and biographical record which contains medical tests, diagnoses, treatments, and so forth. If the medical treatment prescribed is contractually covered by the patient's insurance policy, payment is made for the treatment. If the treatment is not within the covered policy, however, a rejection to the claim is made. As the present system maintains data in digital codes, the comparison of the treatment to the patient's medical and biographical record which contains medical tests, diagnoses, treatments, and so forth may be performed either by an individual or by automated means.

Automated comparison of treatment to a patient's medical and biographical record provides additional confidentiality to a patient's medical and biographical data as a computer could simply compare diagnoses and treatment codes to the codes covered by the insurance provider. This method results in a qualitative approval or rejection of a claim being output by the computer rather than an individual looking at a patient's medical and biographical data which the patient desires to remain private.

In yet a further aspect of the insurance provider embodiment, a third party intermediary obtains the insurance provider's digital codes for medical treatment that the insurance provider covers in its policies and compares them to the medical treatment digital codes to the digital codes contained in the patient's medical and biographical record. If the insurance provider's policy criteria (e.g., terms of insurance contracts, explanation of benefits and services, etc.) are satisfied for a medical treatment, the third party informs the insurance provider that it should pay for the

medical treatment claim. If the criteria is not met, the third party informs the insurance provider to deny the medical treatment claim. This comparison and subsequent instruction to pay or deny a claim may also be made by an individual employed by the third party or via automated means. Thus, by using a third party, a patient's medical and biographical data are kept confidential from the insurance provider.

Yet a further embodiment of the present invention is the utilization of the centralized medical and biographical records system as a database from which medical insurers may determine health care costs and determine insurance premiums in a cost-effective manner.

The current system of financing health care is inefficient, expensive, inequitable, and complex. One of the areas of difficulty in the present health care system is the verification of services rendered and reasonable financing of the services. Finding a formula that can be equitable to the insured patient through satisfying medical, emotional, sociologic and psychological needs and desires, health care providers (*e.g.*, physicians, hospitals, etc.), employers, and the insurance industry, has not been solved. Multiple approaches have been tried during the last century but have fallen short of balancing the needs of the interested parties. As a result, a multitude of systems now exists that is becoming less functional and on the verge of collapse.

To address the above inequities, a number of assumptions must first be made. Such assumptions include: (1) health care insurance is a privilege obtained by participating financially in proportion to income and wealth; (2) basic health care may be offered free at government or society's discretion, to those to poor to participate financially, with the provision that they carry their load of behavioral commitment; (3) all

participants are required to actively engage responsibly in their health care. The participation to be defined later; (4) the financial burden is shared between employer and employees; (5) financial rewards are shared between employer and employees; (6) incentives, both positive and negative are built into the system to effectuate assumptions (4) and (5), as described above; (7) level of coverage or benefits are defined by premiums; (8) the system is a private one, independent of government, and insurance, financial, or health care industry. These assumptions permit a level of independence necessary for the system to remain fair, equitable, and viable and available.

Another embodiment of the present invention is a health care financing and insurance system. Areas of difficulty in the present health care system are the verification of health care services rendered and reasonable financing of the services. A successful system should be equitable and balance the needs of the insured patient (satisfaction of medical, emotional, sociologic and psychological needs and desires), the health care providers (physicians, hospitals, etc.), the employer, and the insurance industry. Multiple approaches tried during the last century have fallen short of their targets. As a result, a multitude of failing systems exist.

The characteristics necessary for a viable and functional system include:

1- Simplicity: to make it easily understandable, applicable and enforceable.

2- Affordability: so that the majority of the population could benefit

3- Equitability: so that financial input results in clear and tangible benefits to all.

4- Confidentiality: to ensure the necessary information is correct and safe.
5- Financially attractive: to encourage participation.
6- Rewarding of behavior that benefits one's health.
7- Monitoring and outcome evaluation to continually improve care.

Cooperation of parties such as the patient, the employer and the government is needed for such system to succeed. Needed information includes a complete, up-to-date patient history, a comprehensive examination, full integration of family and genetic history, patient education as to therapies (preventive, conservative, medical, surgical a working differential diagnostic plan,), and therapy effectiveness and cost. Also necessary would be the implementation of effective monitoring, corrective procedures, and outcome evaluation.

The system of the present invention can balance all of the above requirements and provide the necessary basis for development of an improved health care finance and insurance system. By compiling all the available and necessary medical information and recommendations, such as the specific diagnosis and prescribed services or treatments, rapid verification of appropriate diagnostic or therapeutic decisions can be made according to criteria for approved therapeutic methods for specific diagnoses. If a health care provider disagrees with a denial for services, it can quickly input corrective information to satisfy the requirements. Since patient verification of facts is required for final approval, the amount of false information or representation can be substantially reduced, albeit not eliminated. Dishonest practitioners could still manipulate the system; however, unusual or abnormal patterns of behavior could be

eventually sifted out and those practitioners monitored closely or eliminated from the roster of approved providers after appropriate application of protocols.

The most effective way to control costs is to share financial burden with the patient. By providing education and information, decision-making empowerment is conferred to the patient. By burdening a portion of the expenses on the patient, reluctance to ignore fiduciary responsibility is reduced significantly. Adding financial incentives and rewards may beneficially engender a high degree of patient cooperation.

Employer cooperation entails full and honest disclosure of financial package awarded to each individual in the program. Levels of financial reward, rather than exact amounts may suffice.

Verification of income level of individuals would require governmental cooperation.

In several embodiments of the health care finance and insurance system of the present invention, rights are dependent on the level of financial burden. The most equitable formulation ties the financial burden to level of income and wealth. Some possible embodiments include:

1) Insurance premiums bracketed to income level: An insurance premium for standard coverage at no more than 5% of gross income, plus an out-of-pocket cap of another 5%, with maximum financial exposure set at a certain top level of income. This structure could limit the total care expenditure to no more than 10% of gross annual income for most individuals or families with lesser percentages for those whose income exceeded the top limit. Inequities may still exist in this embodiment as

one family may spend less than 1% of gross income per year, another may spend close to 5% of gross, another may spend 50% of gross, pay only 10%, and use up the pooled contributions of others.

2) Tiered coverage: Universal coverage for all, pegged at 1% of gross individual annual income. Scaled added coverage of progressive premiums with two or more levels add alternatives or layers of comfort or coverage to a basic health plan.

3) Self-insured package: Targeted to large companies or conglomerates of smaller companies. For example, companies may contribute a fee representing 60% of the estimated premium while the employee contributes 40%. The pooled contributions then pay the approved expenses covering 60% and the patient paying the other 40% out-of-pocket. Out-of-pocket expenses are limited pegged to a set level of income. Coverage above the set level is at 100% of approved expenses.

Because a 40% co-payment by the employee is required, the employee, in conjunction with the present invention, acts as a gatekeeper and overseer of the account. The present invention can find the extremes and the average costs of health care provider activities and inform the user of the reasonable costs of services. The user can then negotiate a reasonable fee for services based on the information or pay a higher cost from out of pocket if the user so desires. The insurance coverage of 60% would remain based on average or standardized fees; thereby limiting the pay-out. The above percentages may be varied in the self-insured package to meet the varied

needs and financial capabilities of both the employee and employer.

A health care finance and insurance method can be structured on the biological and medical database of the present invention that can compare patient records approved treatment methods, approve or disapprove payment, and also act as the insurance management system which collects premiums and contribution monies, and pays for approved services or treatments. The health care finance and insurance method therefore must have access to health care, financial, and insurance policy information. Additionally, if the system is to also pay for the medical expenses, it must receive premiums and co-payments and have access to financial accounts.

Thus, a health care finance and insurance method based on the present invention would maintain medical, biographical, diagnostic, and treatment records for a plurality of individual patients in a medical and biographical records database on a centralized computer. Insurance service and policy information would also be maintained. Examples of the service information include terms of insurance contracts, explanation of benefits and services, pre-approval of patient services, pre-approval of treatment, approval of treatment, verification of eligibility for medical treatment, verification of treatment, and automated payment of medical treatment. Relevant policy information includes the approved treatment methods for diagnoses. This enables the system to compare patient diagnosis and prescribed services or treatment records present in the medical and biographical records database with the approved therapeutic treatment for the identified diagnosis. From this information, the system would

either approve or disapprove payment for the prescribed services or treatment.

Regarding the financial aspects of the system, health care coverage information maintained for individual patients would identify the patient and insurer contributions to a health care policy. The insurer may a typical insurance company, an employer, or other insuring organization. The system would also maintain financial accounts to hold health care premiums and payments of health care treatments received from the patient and the insurer or employer. From these accounts, the system would pay the health care provider for approved treatments. The patient would then bill the patient to their co-payment contribution proportions identified in the insurance policy.

A self-insured package based on the present invention would be beneficial to companies by significantly trimming costs by eliminating repetitious, erroneous, or unnecessary testing or treatments. The health care financing and insurance system embodiment of the present invention would act as a manager or managing system by discriminating between adequate and non-adequate therapies. On the other hand, the individual is still free to pursue whatever avenues of treatment or investigation he or she desires, as long as the individual is willing to carry the financial burden. Eliminating middle managers and clerks would substantially add to the savings and give incentive to the companies to promote this particular form of health care.

Economics, degree of health services, security and confidentiality of records, accessibility, and availability provide incentives to the individual to participate in the new, developing form of health care utilizing the present invention. By using electronic communications and multiple

interactive formats, accessibility and availability can be solved readily. Security and confidentiality of records require utilizing technology that provides a high degree of security after relatively minimal education on its use.

Degree of health services is where a great deal of sophistication and development is necessary to provide all the necessary and desired services; the goal should be directed towards preventive medicine rather than on therapeutics. If a solid system of preventive medicine can be developed, the cost of health care can be reduced substantially.

Economics is perhaps the most difficult and perhaps also the biggest incentive to participate in this system. The financial incentive has to be sufficiently obvious and desirable to most individuals to obtain their cooperation. Structuring the incentives will determine the level of success of the system.

The sponsoring companies should have reasonable financial and human resource benefits to entice them to offer the services. At the present and foreseeable rate, health care expenses represent an enormous drain on any company. The drain comes in two main fashions: direct cost and payments, and indirect costs due to lost or impaired productivity and damages. Worst of all, the present system of care is devoid of the necessary incentives to stimulate the individual to actively engage in preventive rather than therapeutic care. Creating a formula that encourages individuals towards prevention is not an easy task, as numerous failures have demonstrated in the past. Reducing direct costs can only be achieved by shifting part of the financial responsibility to the individual; this represents a reversal of the past 40 year trend and a difficult sell job unless substantial benefits to the individual can be added to the equation to sway the

balance. By improving the overall health of the work force and reducing unproductive activities, further benefits to the company will accrue; refined method for measuring this benefit will have to be developed.

The following examples will illustrate the invention.

Example I - Structuring a Health Diagnostic Program

An example of the health diagnostic program of the present invention may be structured in a variety of ways. One example, though not intended to be limiting, includes four elements. These elements include 1) a diagnostic questioner, 2) question codification, 3) stratification of body parts, and 4) weight analysis of responses to diagnostic questions.

1) Questioner

Not all questions must be applied to each query. Some questions may require repetition at different points in the process to ascertain the validity and consistency of responses, and confirm interviewee understanding of the question. This approach makes the process programmable, statistically analyzable and standardizable. Six areas are considered, divided into sectors, subsectors, sections and subsections as follows:

1-What
2-Where
3-When
4-Whom
5-How
6-Why

2. Question Codification:

Questions are codified to facilitate organization of the information and programming by using a code of at least ten digits, although more digits may be necessary based upon the number of questions. A full historical interview may be obtained by combining the coded questions. With sufficient reiterations, a relatively high degree of certainty can be reached towards the correct diagnosis being included in the list of potential diagnoses.

Table I illustrates exemplary code ranges used to identify answers to diagnostic questions and are suffixed (alternatively, the codes may be prefixed) to a diagnostic question code and used in the differential evaluation of potential diagnoses. While an individual is only permitted to answer "yes" or "no" to a question, the diagnostic program can construct complex codes that are invisible to the individual that are based upon a plurality of symptoms. The codes in addition to "yes" and "no" also include "neither," "both or all," "and," "none," and "or." The complex codes are assigned to complex questions for constructing a differential ranking of diagnoses.

Table I - Answer Codes

Answer	Code
no	000
yes	111
neither	001
both or all	011
and	100
none	010
or	110

The diagnostic questions are grouped by symptoms and signs organized into organs or systems. Given a single or a multiplicity of symptoms, each symptom is addressed independently at first. Lists of grouped characteristics of each symptom are presented for selection (yes or no for each alternative). Subsequent questions refine the elicited characteristics with yes or no answers. The full symptom description is presented, including all the positives and pertinent negatives for approval (yes or no). This process is repeated for each symptom. Finally, the symptom descriptions are summarized and presented for approval (yes or no). A differential list of diagnoses is then presented in hierarchical order from most likely to least likely.

Digital areas are codified in Table II illustrating exemplary code ranges for the overall diagnostic program and the segregation and recognition of meaning.

Table II - Overall Diagnostic Program Codes

AREA	DIGITAL CODE
Symptoms	00000000001 to 19999999999
Signs	20000000000 to 29999999999
Laboratory data	30000000000 to 39999999999
Imaging data	40000000000 to 49999999999
Family history, Symptom history, genealogy, vaccines	50000000000 to 59999999999
Medications and drugs	60000000000 to 64999999999
Surgical therapies	65000000000 to 69999999999
Diagnosis	90000000000 to 99999999999
etc.	

Diagnostic program areas are subdivided into sectors, sub-sectors, sections, and sub-sections. Table III illustrates exemplary code ranges that are used to define sectors.

Table III - Sector Codes

AREA	DIGITAL CODE
pain	00000000001 to 000000005000
cough and expectoration	00000005001 to 000000010000
chills and sweats	00000010001 to 000000015000
temperature	00000015001 to 000000020000
malaise	00000020001 to 000000025000
weight	00000025001 to 000000030000
eye and visual disorders	00000030001 to 000000035000
ear and auditory disorders	00000035001 to 000000040000

AREA	DIGITAL CODE
sensory	00000040001 to 000000050000
motor/muscle	00000050001 to 000000060000
nose and olfactory disorders	00000060001 to 000000065000
coordination	00000065001 to 000000075000
balance	00000075001 to 000000085000
growth	00000085001 to 000000095000
skin	00000095001 to 000000110000
tongue and taste disorders	00000110001 to 000000120000
mouth	00000120001 to 000000125000
teeth	00000125001 to 000000130000
neck	00000130001 to 000000140000
chest	00000140001 to 000000145000
breast	00000145001 to 000000150000
heart	00000150001 to 000000165000
circulation	00000165001 to 000000175000
lungs	00000175001 to 000000185000
respiratory	00000185001 to 000000200000
upper G.I.	00000200001 to 000000205000
stomach	00000205001 to 000000210000
small intestines	00000210001 to 000000215000
large intestines and rectum	00000215001 to 000000220000
liver	00000220001 to 000000225000
pancreas	00000225001 to 000000230000
thyroid	00000230001 to 000000235000
parathyroids	00000235001 to 000000240000
adrenals	00000240001 to 000000245000
kidneys	00000245001 to 000000255000

AREA	DIGITAL CODE
ureters and bladder	00000255001 to 000000260000
testicles and male functions	00000265001 to 000000270000
uterus, ovaries and female functions	00000270001 to 000000280000
upper extremities	00000280001 to 000000285000
lower extremities	00000285001 to 000000290000
genetics	00000290001 to 000000300000
embryonic, fetal and gestation	00000300001 to 000000310000
neonatal	00000310001 to 000000320000
vaccines	00000320001 to 000000330000
addictions	00000330001 to 000000340000
bacterial infections	00000340001 to 000000350000
viral infections	00000350001 to 000000360000
fungal infections	00000360001 to 000000370000
vitamins	00000370001 to 000000380000
upper back	00000380001 to 000000390000
lower back	00000390001 to 000000400000
genetic disorders	00000400001 to 000000410000
cancer	00000410001 to 000000420000
leukemia and lymphomas	00000420001 to 000000430000
anemia and blood	00000430001 to 000000440000
diabetes and metabolic disorders	00000440001 to 000000450000
allergies	00000450001 to 000000460000
birth defects	00000460001 to 000000470000
sleep disorders	00000470001 to 000000480000
mental health disorders	00000480001 to 000000490000

AREA	DIGITAL CODE
cognitive disorders	00000490001 to 000000500000
convulsions/epilepsy	00000500001 to 000000510000
consciousness and syncope	00000510001 to 000000520000
head and headaches	00000520001 to 000000530000
etc.	

Sector codes are further parsed into sub-sector codes. Table IV illustrates exemplary code ranges used to define sub-sectors.

Table IV - Sub-Sectors

Area	Digital Code
acute pain	00000000001 to 00000000010
sub-acute pain	00000000011 to 00000000020
chronic pain	00000000021 to 00000000030
constant pain	00000000031 to 00000000040
sharp pain	00000000041 to 00000000050
throbbing pain	00000000051 to 00000000060
etc.	

Similarly, sub-sector codes are further parsed into section codes. Table V illustrates exemplary code ranges used to define acute pain sector codes.

Table V - Sections

Area	Digital Code
sharply localized central acute pain	00000000001 to 0000000003
general area acute pain	00000000004 to 00000000006
radiating localized acute pain	00000000007 to 00000000009
etc.	

Section codes are further parsed into sub-section codes. Table VI illustrates exemplary code ranges used to define sharply localized acute pain to general area acute pain sub-sections.

Table VI - Subsections

Area	Digital Code
sharply localized central acute pain	00000000001
sharply localized to the right acute pain	00000000002
sharply localized to the left acute pain	00000000003
general area central acute pain	00000000004
general area to the right acute pain	00000000005
general area to the left acute pain	00000000006
radiating localized central acute pain	00000000007
radiating localized to the right acute pain	00000000008
radiating localized to the left acute pain	00000000009
etc.	

EXAMPLE 2 - Diagnostic Questioning

Symptoms

Presenting symptoms: headache, fever, vomiting, feeling awful.

Sufficient information are generated according to the medical diagnostics program to reach, by logical progression of inclusion, potential diagnoses that can be ranked from most likely to least likely. Potential diagnoses are ranked by correlating information received from individuals regarding subsections of different sectors and diagrams or graphical information provided by the individual, in a pattern of basic questions such as what, where, when, whom, how, and why. Questions can also be analyzed in reverse to determine potential diagnoses, such that by eliminating what is not, what is left is what it may be a potential diagnosis in the order of least to most likely.

As an example, an individual may be initially asked general questions such as the individual's sex, age, height, weight and so forth.

Once general questions have been asked and answered, questions may be asked regarding health symptoms and the location of the symptoms being experienced by an individual. These questions would fall into the "what" line of questioning. An example of such a question would be, "Do you have a headache?" If an individual were to affirmatively indicate the presence of a headache, the location of the headache would be determined by "where" types of questions. For example, the individual would be asked if the headache pain is localized (restricted to one area or part of the head). If the individual answers affirmatively, follow-up Y/N questions are asked to determine what location of the head

aches such as "Front?," "Back?," "Right side?," "Left side?," and "All?"

Further questioning determines they type of pain experienced (a "what" type of question). An example of which would be, "Is the pain acute (of very rapid onset or development)?"

In all questions and answers, an answer of "Yes" would append the code "111" to the end of the diagnostic question code. Thus, an answer to a question will contain three digits more than the diagnostic question code. Thus, a question regarding whether sharply localized acute pain was present would result in an answer code of 00000000001+111 for a "yes" answer or 00000000001+000 for a "no" answer.

Answering yes to the questions regarding whether the pain is localized and if the pain is acute immediately eliminates questions regarding 0000000004 to 0000000060. On the other hand, answering no to the questions brings up 0000000004, etc.

By utilizing graphics (*i.e.*, body diagrams which are digitized for patterns) anatomical localization and symptom description can be matched, narrowing diagnostic alternatives.

Signs

A similar approach is used for signs, utilizing as many interactive methods as possible to elicit them and confirm the veracity of presence (positive) or absence (negative) by cross-referencing signs whenever possible. Important or indispensable signs can be triple weighted, lesser important are double weighted, and even lesser, simple weighted. With the advent of electronically acquirable signs (*i.e.*, audio cardiovascular; pulmonary; electric, such as EKGs, EEGs; etc.) higher weights can be assigned to these findings.

The above process is repeated for family history, symptom history, genealogy, laboratory, imaging, and so forth.

Differential Diagnoses Process

Segregation of "yes" answers in one column and "no" answers in another initiates the process for differentiating the potential diagnoses (the "differential diagnoses process"). By suffixing (or prefixing) the codes for yes (111) or no (000) to a question's code, a complexed code is created that is compared with all the potential diagnoses. The diagnoses containing the complexed code as part of their description are then selected. This eliminates all the diagnoses that are not possible. By matching the "yes" answers with all potential diagnosis codes, the unmatched are eliminated. The matched diagnosis codes represent the positive findings. By matching the "no" answers to the potential codes the unmatched are eliminated. The unmatched codes thus represent the negative findings that further help define the differential diagnoses process.

Various combinations of positives (111) are given different relative weights. Similarly, combinations of negatives (000) are also given different weights. For example, absolutely essential complexed codes for a diagnosis are be given a triple weight; important complexed codes are given double weight; and non-essential or important complexed codes are given simple weights. The complexed code weights can be increased or decreased further by considering some of the characteristics present in a combination of symptoms.

The positive findings are used to select all the potential diagnoses. The negative findings are used eliminate potential diagnoses and to compliment the positive findings.

The combination of positive and negative findings suggest all the potential diagnoses.

Relative weights assigned to different positive combinations set a hierarchy of potential diagnoses. The negatives are used to degrade the relative weights assigned to each potential diagnosis. Data acquired from the patient such as the patient's medical history, social history, family history, genealogy history, genetic constitution, laboratory and imaging tests, medications, medical and surgical therapies, demographics, location, past history, recently encountered incidence of illnesses, and any other factor that experience teaches may add or subtract to the probability of a diagnosis or its position in the realm of potential diagnosis are used to further modify or dampen the weighting. Thus, modifying and dampening information are used to refine hierarchy of the potential diagnoses.

After the potential diagnoses are weighted, a ranked list of diagnoses are presented that should include the correct diagnosis in a high percentage (*e.g.*, at least 99%) of the occasions. The ranking can be further characterized by dividing the diagnoses into groups such as the diagnoses with the highest probability, the top 10% of the potential diagnoses having the highest weighting, the middle 60%, and bottom 30%. Color-coding the list of potential diagnoses can further highlight the groups.

Since the interactive interview is occurring simultaneously to the analysis, reiterative questioning can be generated to re-assess the weight of potential combinations to confirm or refute analytical assumptions. The reiterative questions become progressively more complex and complete, refining the diagnoses.

As personal computers and the Internet continue to improve in speed and technology, the interchange will appear to be a real time event. Absent an intimidating interviewer (*i.e.*, health care provider) and surroundings, time pressure, or other constraining factors, it is anticipated that the interviewee will provide more accurate and reliable answers. The interaction can also be used as a practice interview prior to a real encounter, as a supplementary or a substitute interview which would be delivered to the health care provider, or as a check on the performance of the health care provider.

The medical diagnostic program also accounts for individuals who try to confuse the interview by providing false or incongruent data. Fabricated or incongruent data, if not accounted for, may lead to the impossibility of reaching a diagnosis. Manipulated data may lead to a wrong diagnosis. Anticipating the likelihood that such data will be entered by individuals, a caveat is posted at the beginning of the interaction warning of the possibility and disclaiming responsibility.

EXAMPLE 3 - Insurance and Finance System

Financing of health care has been a controversial issue of care in the last century. The controversy persists into this century since a reasonable solution has not been developed. As it exists, the present system is on the verge of collapse. Current methods of financing health care are inefficient, expensive, inequitable, complex, and top-heavy. Patchwork repairs have been made throughout the last century, gradually worsening the process. A solution to the dilemma would be of substantial benefit to society.

To solve the problems associated with financing health care, a number of assumptions can be made to correct some of the potential inequities and barriers. Some of these assumptions include:

1) Health care insurance is a privilege obtained by participating financially in proportion to income and wealth.

2) Basic health care may be offered free at government or society's discretion to those too poor to participate financially. Provisions for such coverage may require covered individuals to fulfill defined behavioral commitment.

3) All participants are required to actively engage responsibly in their health care.

4) The financial burden is shared between employer and employees.

5) Financial rewards are shared between employer and employees.

6) Incentives, both positive and negative, are built into the system to effectuate paragraphs 4 and 5, as described above.

7) Level of coverage or benefits are defined by premiums.

8) The system is privately operated, independent of government, and insurance, financial, or health care industry. This structure permits the level of independence necessary for the system to remain fair, equitable, viable and available.

Individuals pay 40% of premium fee; employers pay 60% annually. The health care financing and insurance system of the present invention acts as a manager that collects fees,

income data, verification of need for services, verification of services rendered, agreed fees, payments for services, conflict resolution, investment of moneys, and dividend payments.

All approved visits, interventions, etc. are covered at 60% of the agreed fees. The individual pays 40% of the fees with a maximum out-of-pocket expense of 10% of gross income per year. After the cap is reached, the health care financing and insurance system (manager) pays all approved expenses above the cap. Each account runs a continuous tally. At retirement or after a predetermined number of years, the contributions by the employee and the employer are tallied and total expenses subtracted. Positive accounts receive a formula-directed dividend from the invested residuals; negative accounts receive nothing.

In order for this structure to work, all payments for services would have to be directed through the health care financing and insurance system. The employee would be billed for the co-payment or a deduction made directly from the paycheck.

The system can also financially manage the premiums in a manner that may produce financial benefits to the patient, or the insured party if the patient is covered by the insured parties policy (e.g., the child of an insured parent). The pooled residuals are invested long-term on a 6 to 12 months trailing wait. Savings produced from premiums and payments exceeding health care expenses may be invested or used to purchase further health care or long-term coverage. At the predetermined time, capital and interests, are distributed between employee and employer. The distribution formula can be proportional to contributions or biased to favor employer or employee according to stipulated contractual agreements.

The distribution may occur at predetermined time such as after 20 years, after retirement, or at an age of 59.5 years similar to a pension distribution.

Controls:

1) Income verification: The best way to verify income is to obtain data from a governmental agency, such as the Internal Revenue Service. Due to privacy issues, however, such data may be required to be done anonymously and/or by income tax brackets. Alternatively, the employer could submit data to indicate the gross income level. This approach would work well for singles with no other jobs; individuals with more than one job could underpay, though it would not pose a significant problem. For families with more than one source of income, voluntary declarations would be the easiest to obtain, however, such declarations could also be easily falsified.

2) Verification of need of services: Verification would be contributed by the system of the present invention.

3) Verification of services rendered: Verification would be contributed by the system of the present invention.

4) Agreed fees and payments could be controlled utilizing the insurance program of present invention.

5) Conflict resolution would require a panel of experts. The process would be enormously aided by the information contained in the system of the present invention. One strategy would be to present cogent arguments against an unapproved or not indicated therapy; if individuals insisted on obtaining such treatment, they

would be responsible to pay 60-70% of costs and the health care financing and insurance system pays the difference.

6) Investment of monies and dividend payments require development.

In view of the above, it will be seen that the several objects of the invention are achieved.

As various changes could be made in the above systems and processes without departing from the scope of the invention, it is intended that all matter contained in the above description be interpreted as illustrative and not in a limiting sense.